A LIST OF

THE FRESHWATER FISHES OF CANADA

EAST OF THE ROCKY MOUNTAINS

With Keys

By J. R. DYMOND

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A LIST OF THE FRESHWATER FISHES OF CANADA

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This is a first attempt to produce a key and distributional list of the freshwater fishes of Canada east of the Rocky Mountains.

It is expected that errors and omissions will be found in it. Those who discover such errors are asked to report them to the author so that they may be corrected in future editions.

The key has been issued at the present time because Hubbs and Lagler's Guide to the Fishes of the Great Lakes and Tributary Waters is at present out of print. A revised edition under the title "Fishes of the Great Lakes Region" is to be published in the spring of 1947.

This key and distributional list is not intended to replace that of Hubbs and Lagler in Canada, but to supplement that excellent work by giving more detailed information on Canadian ranges and by extending the area to which the range information and keys are applicable.

As will be readily apparent, the author has leaned heavily on the information in Hubbs and Lagler's work.

KEY TO THE FAMILIES

A Mouth a sucking disc without jaws; gill-openings 7 ..... Petromyzonidae

AA Mouth with true jaws; gills covered by opercular bones

B Caudal fin heterocercal

C Body naked or more or less covered by plates

D Body naked; snout paddle-like ..... Polyodontidae

DD Body more or less plated; snout conical .... Acipenseridae

CC Body scaled; caudal fin abbreviate-heterocercal

E Scales thick, rhombic ganoid ..... Lepisosteidae

EE Scales cycloid ..... Amiidae

BB Caudal fin nearly or quite homocercal

F Ventral fins abdominal or lacking

G Body not eel-shaped; ventral fins present

H One dorsal fin, not preceded by a series of free spines

K An adipose fin present

L Barbels about mouth; body scaleless... Ameiuridae

LL Head without barbels; body scaled

M Scales ctenoid ..... Percopsidae

MM Scales cycloid

N Scales usually fewer than 100 in lateral line

O Base of dorsal fin shorter than head

P Teeth strong ..... Osmeridae

PP Teeth very weak or absent .... Coregonidae

OO Base of dorsal fin longer ..... Thymallidae

NN Scales more than 100 in lateral line; strong conical teeth on jaws, vomer, palatines and tongue ..... Salmonidae

KK No adipose fin

Q Gill membranes broadly joined to the isthmus

R Lips thick; plicate or papillose; pharyngeal teeth numerous and comb-like ..... Catostomidae

RR Lips never thick; pharyngeal teeth fewer than 9 on a side ..... Cyprinidae

QQ Gill membranes not attached to isthmus

S Head scaly, more or less

T Upper jaw protractile ..... Cyprinodontidae

TT Upper jaw not protractile

U Jaws depressed, prolonged; lateral line present ..... Esocidae

UU Jaws short; no lateral line .. Umbridae

SS Head naked

V Lateral line well developed ..... Hiodontidae

VV Lateral line wanting ..... Clupeidae

HH Dorsal fin not as in H
W Dorsal fin single, preceded by free spines ..... Gasterosteidae
WW Dorsal fins two, the first composed of four weak spines ..... Atherinidae
GG Body eel-shaped; ventral fins wanting..... Anguillidae
FF Ventral fins thoracic or jugular
X Body covered with scales
Y Rays of ventrals I,5; fin thoracic in position
Z Lateral line extending on caudal fin; anal spines 2, the second very strong .. Sciaenidae
ZZ Lateral line not extending beyond base of caudal fin
a Dorsal fins 2, entirely separated or slightly joined together
b Anal spines 3 ..... Serranidae
bb Anal spines 1 or 2 ..... Percidae
aa Dorsal fin single (deeply emarginate in Huro); anal spines 3 or more (except very rarely in Micropterus)..... Centrarchidae
YY Rays of ventrals not I,5; fin jugular in position ..... Gadidae
XX Body scaleless or with few prickles only .. Cottidae

PETROMYZONIDAE

A Dorsal fin continuous, not divided into two distinct fins
  B Adults not parasitic; teeth degenerate and intestinal tract reduced to a strand ..... Ichthyomyzon fossor
  BB Adults parasitic; teeth well developed and intestinal tract functional ..... Ichthyomyzon unicuspis

AA Two distinct dorsal fins
  C Teeth in buccal funnel radiating in all directions from the mouth ..... Petromyzon marinus
  CC Teeth in buccal funnel not radiating in all directions from the mouth
    D Intestine of adults degenerate and non-functional; teeth weak ..... Entosphenus lamottenii
    DD Intestine of adults well developed and functional; teeth strong ..... Entosphenus japonicus

Ichthyomyzon unicuspis Hubbs and Trautman. Silver lamprey.
The St. Lawrence drainage from Quebec and Lake Champlain to but not including Lake Ontario. It also occurs in lakes Erie, Huron, Superior and Nipissing in Ontario and Nelson River, Man. I. castaneus has been recorded from the Winnipeg River.

Ichthyomyzon fossor Reighard and Cummins. Michigan brook lamprey.
Recorded for Ontario only from the Thames River system.

Petromyzon marinus Linnaeus. Sea lamprey.
Anadromous in streams of the Maritime Provinces and Gulf of St. Lawrence. Permanently resident in lakes Champlain and Ontario and since 1921 in Lake Erie from which it has spread to Lake Huron.

Entosphenus lamottenii (Le Sueur). American brook lamprey.
In Ontario recorded only from streams flowing into the western end of Lake Ontario.

Entosphenus japonicus Martens.
A subspecies, Entosphenus japonicus septentrionalis (Berg) occurs in the Mackenzie River drainage as well as in the Yukon.

POLYODONTIDAE

Polyodon spathula (Walbaum). Paddlefish.
Recorded a few times from Great Lakes waters; Ontario records are - Lake Erie, Lake Huron near Sarnia, at Spanish River on North Channel of Georgian Bay and Lake Helen, Nipigon River.

ACIPENSERIDAE

Acipenser fulvescens Rafinesque. Lake sturgeon.
Lake Champlain, Upper St. Lawrence River, Great Lakes and the larger lakes northward, north in the Hudson Bay drainage to the Churchill River in Manitoba and west in the Saskatchewan River to Alberta.

as far as Lake Temiskam

LEPISOSTEIDAE

A Beak long and slender, length from tip to front of eye about three times distance from eye to posterior edge of gill-cover ..... Lepisosteus osseus

AA Beak shorter and broader, length about twice distance from eye to end of gill-cover ..... Lepisosteus productus

Lepisosteus osseus (Linnaeus). Longnose gar.
Great Lakes from head of Lake Huron to St. Lawrence, 75 miles below Quebec City; Ottawa River, Lake Simcoe and Lake Nipissing. Our form is subspecies L. osseus oxyurus Rafinesque.

Lepisosteus productus Cope. Shortnose gar.
The only Canadian area from which this species has been recorded is Lake Erie where it is much rarer than the longnose gar.

AMIIDAE

Amia calva Linnaeus. Bowfin.
Great Lakes from head of Lake Huron to the St. Lawrence; Ottawa River, Lake Simcoe.

HIODONTIDAE

A Dorsal fin of 9 or 10 developed rays, inserted behind a vertical through insertion of anal.. Amphiodon alosoides

AA Dorsal fin of 11 or 12 developed rays, inserted in front of a vertical through insertion of anal ..... Hiodon tergisus

Amphiodon alosoides Rafinesque. Goldeye.
Specimens in Royal Ontario Museum of Zoology from Abitibi Lake and River; Maynard Lake 40 miles north of Kenora; Sandy Lake, Patricia District, Ontario; Lake Winnipeg; Saskatchewan River; Lake Athabaska; Lesser Slave Lake; Fort Smith, NWT. Reported from Lake of the Woods; Red and Assiniboine rivers, Manitoba; and Great Slave Lake.

Hiodon tergisus Le Sueur. Mooneye.
Specimens in the Royal Ontario Museum of Zoology from Upper St. Lawrence and Lower Ottawa rivers; Bay of Quinte, Lake Ontario; Lake Erie and Moose River near mouth of Abitibi. Reported from Lake of the Woods and Red and Assiniboine rivers in Manitoba.

CLUPEIDAE

A Last ray of dorsal much longer than those in front of it ..... Dorosoma cepedianum

AA Last dorsal ray not lengtened

B Tip of lower jaw not projecting beyond upper when mouth is closed ..... Alosa sapidissima

BB Tip of lower jaw projects beyond upper when mouth is closed ..... Pomolobus pseudo-harengus

Dorosoma cepedianum (Le Sueur). Gizzard shad.
In Canadian waters practically confined to Lake Erie although it has been taken in Georgian Bay.

Pomolobus pseudo-harengus (Wilson). Alewife.
Anadromous in streams of Maritime Provinces and permanently resident in upper St. Lawrence, Lake Ontario, and certain tributary waters, including Otter Lake and Red Horse Lake, Leeds Co. Since 1931 in Lake Erie from which it has spread to Lake Huron.

Alosa sapidissima (Wilson). Shad.
Anadromous in streams of Maritime Provinces; recorded from the St. Lawrence at Ile-Verte. A spawning run occurs each spring to Point Fortune on the Ottawa River where a dam prevents their further ascent.

OSMERIDAE

Osmerus mordax (Mitchill). American smelt.
Anadromous in rivers of Maritime Provinces; occurs as a permanent freshwater resident in all of the Great Lakes as a result of a planting in Crystal Lake, Michigan, in 1912. Naturally permanently resident also in lakes Utopia and Chamcook, N.B.; Memphremagog, Champlain, St. John, Green and Lac des Isles, P.Q.; Muskrat and Golden lakes, Renfrew Co., Ontario.

COREGONIDAE

A Jaws toothless except for traces of bristle-like teeth.
  B A single flap between nostrils; body subterete
    C Scales 73 or fewer; gill-rakers 14 or fewer ..... Prosopium coulterii
    CC Scales 77 or more; gill-rakers 14 or more
      D Gill-rakers 14 to 19 ..... Prosopium cylindraceum
      DD Gill-rakers 20 to 24
        E Head long; 4.7 or 4.8 in standard length of 30 cm. specimens..... Prosopium oregonium
        EE Head shorter 4.3 to 5.0 in standard length .....Prosopium williamsoni
  BB Two flaps between nostrils; body usually somewhat compressed
    F Gill-rakers fewer than 32; snout blunt, premaxillaries vertical or directed backwards, lower jaw short and more or less included ..... Coregonus clupeaformis
    FF Gill-rakers usually more than 32; snout more or less pointed; premaxillaries usually nearly horizontal; lower jaw almost or quite equal to upper or longer.

G Gill-rakers fewer than 38
  H Gill-rakers usually fewer than 33 ..... Leucichthys johannae
  HH Gill-rakers usually 33 to 38
    I Interorbital width 4.2 to 5.0 in head; adipose length into the sum of caudal peduncle depth and interorbital width 1.5 to 2.1. Leucichthys zenithicus *
    II Interorbital width 3.5 to 4.5 in head; adipose length into sum of caudal peduncle depth and interorbital width 1.9 to 2.4 ..... Leucichthys reighardi

GG Gill-rakers more than 38
  J Specimens over 30 cm. in standard length
    K Head long 4.0 to 4.4 in standard length
      L Gill-rakers 54 or more; eye 4.5 to 5 in head ..... Leucichthys nipigon
      LL Gill-rakers fewer than 54; eye 3.5 to 4.5 in head .... Leucichthys nigripinnis
    KK Head shorter 5.0 to 4.0 in standard length
      M Premaxillaries approaching the vertical as in Coregonus; anadromous in the lower Mackenzie ..... Leucichthys autumnalis
      MM Premaxillaries more nearly continuing line of top of head; lake species .. Leucichthys artedi
  JJ Specimens less than 30 cm. in standard length
    N Head long 3.8 to 4.4 in standard length
      O Eye 14 to 16 in standard length
        P Gill-rakers 46-51... Leucichthys nigripinnis
        PP Gill-rakers 38-45... Leucichthys hoyi
      OO Eye more than 16 in standard length
        Q Gill-rakers 41-45; eye 17 to 18 in standard length ..... Leucichthys kiyi
        QQ Gill-rakers 38-40; eye 18 to 21 in standard length ..... Leucichthys alpenae

    NN Head shorter 4.2-5.4
      R Head 4.6-5.4; gill-rakers 42-48; eye 17 to 20 in standard length ..... Leucichthys sardinella

* zenithicus occasionally has more than 38 gill-rakers.

RR Head 4.2-4.5; gill-rakers 38-57; eye 16 to 22 in standard length .... Leucichthys artedi

AA Jaws, vomer, palatines and tongue with bands of bristle-like teeth; maxillary long, lower jaw prominent ..... Stenodus leucichthys

Prosopium cylindraceum (Pallas). Round whitefish.
From northwestern New Brunswick northwestward through Canada to northern British Columbia and Northwest Territories. Ours is subspecies P. c. quadrilaterale (Richardson), the typical form extending westward in Siberia to the Yenisei River.

Prosopium coulterii (Eigenmann and Eigenmann). Coulter's whitefish.
Originally discovered in the Kicking Horse River at Field and Golden, B.C.; since found in Alaska and the Yukon.

Prosopium williamsoni (Girard). Williamson's whitefish.
East slope of the Rocky Mountains and westward throughout southern British Columbia.

Prosopium oregonium (Jordan and Snyder). Oregon whitefish.
So far found in Canada only in Lesser Slave Lake.

Coregonus clupeaformis (Mitchill)*. Common whitefish.
From Lunenburg and Yarmouth counties, N.S. (possibly introduced), through northern New Brunswick, throughout Canada to Northwest Territories and the Yukon. Because of the great number of variants shown in the thousands of lakes in which whitefish occur, it seems inadvisable at present to recognize subspecies. Some of the Mackenzie whitefish may represent a distinct species.

Leucichthys artedi (Le Sueur)*. Lake herring.
In all the Great Lakes and in many of the interior lakes northward from northern Quebec to Northwest Territories. Very variable. lucidus of Great Bear Lake is regarded as a local variant; tullibee of the Prairie Provinces may also be a form of artedi.

Leucichthys nipigon Koelz. Nipigon cisco.
Lake Nipigon, Lake Abitibi, certain smaller lakes in northwestern Ontario and Lake Winnipeg.

Leucichthys zenithicus (Jordan and Evermann). Longjaw.
Lake Huron, Lake Superior, Lake Nipigon and lakes northwestward to Northwest Territories.

Leucichthys reighardi Koelz*. Shortnose chub.
Lake Ontario, Lake Superior and Lake Nipigon.

Leucichthys nigripinnis (Gill)*. Blackfin; bluefin.
Lakes Huron, Superior, Nipigon, Winnipeg, certain lakes in northern Saskatchewan, and Lake Athabaska, Alberta.

Leucichthys hoyi (Gill). Bloater.
Lakes Ontario, Huron, Superior and Nipigon. Report of its occurrence in Lake Winnipeg needs confirmation.

Leucichthys kiyi Koelz.* Kiyi.
Lakes Ontario and Superior.

Leucichthys johannae (Wagner). Deepwater chub.
Lake Huron.

Leucichthys alpenae Koelz. Longjaw chub.
Lake Huron.

Leucichthys autumnalis (Pallas). Lauretta herring.
Anadromous in rivers of northwestern America and northeastern Asia. American form described as L. laurettae.

Leucichthys sardinella (Valenciennes). Big-eye Mackenzie herring.
Anadromous in rivers of northwestern America and northeastern Asia. American form described as L. pusillus.

Stenodus leucichthys (Güldenstadt). Inconnu.
In America confined to Alaska, Yukon and Northwest Territories, east to the Anderson River; probably landlocked in Great Slave Lake but anadromous in the lower Mackenzie. Ours is subspecies S. l. mackenzii; the typical form is found in the Caspian Sea. Another subspecies, S. l. nelma occupies the Arctic drainage of Asia as far west as the White Sea.

* Subspecies have been described but it is the belief of the present author that the recognition of local populations of Coregonine fishes by subspecific names is, in the present state of our knowledge, likely to lead to confusion rather than to enlightenment.

THYMALLIDAE

Thymallus signifer (Richardson). Arctic grayling.
Northern Manitoba, Saskatchewan and Alberta as well as the Northwest Territories and Yukon, north and west from the Churchill River and a few smaller rivers to the south (Broad, Owl and Silcox), not in the Nelson which is the most northwesterly in which Salvelinus fontinalis occurs.

SALMONIDAE

A Anal fin usually with fewer than 13 rays
  B Vomer flat, the teeth on its backward extension in one or two rows (sometimes lost with age); mostly black-spotted.
    C Anal usually with 9 fully-developed rays; caudal usually unspotted.
      D Vomerine teeth little developed, those on shaft few and deciduous; scales from adipose fin to

lateral line 10 to 13; maxillary to below hind edge of pupil at 150 mm., never far behind in adult; caudal generally emarginate even in large adults; black spots on body small without halos ..... Salmo salar

DD Vomerine teeth well developed; those on shaft of bone numerous and persistent; scales from adipose fin to lateral line 12 to 16; mouth, larger, maxillary to below hind edge of eye at 150 mm., farther back in larger specimens; caudal less emarginate, truncate in adults; black spots on body large, many surrounded by halos ..... Salmo trutta

CC Anal with 10 or more fully developed rays; caudal spotted

E No hyoid teeth nor red under mandible; scales large, usually in fewer than 150 rows

F Scales usually in fewer than 140 rows ..... Salmo gairdnerii

FF Scales usually in 140 or more rows. Salmo kamloops

EE Hyoid teeth and red under mandible usually present; scales smaller, usually in more than 150 rows ..... Salmo clarkii

BB Vomer boat-shaped, the shaft depressed and without teeth on its backward extension; species with reddish or pale spots

G Sides with light or pinkish spots, hyoid teeth present

H Tail deeply forked; back and sides with light-coloured spots ..... Cristivomer namaycush

HH Tail less deeply forked; back uniformly coloured and sides with pinkish spots ..... Salvelinus alpinus

GG Sides with red spots surrounded by blue borders; back vermiculated; hyoid teeth usually lacking ..... Salvelinus fontinalis

AA Anal fin with 13 to 19 developed rays

J Back and tail fin with distinct black spots

K Scales in 170 or more rows ..... Oncorhynchus gorbuscha

KK Scales in fewer than 155 rows

L Black spots on both upper and lower halves of caudal fin; anal rays 15 to 19; branchiostegals 13 to 19 ..... Oncorhynchus tschawytscha

LL Black spots only on upper half of caudal fin; anal rays 12 to 17; branchiostegals 11 to 15 ..... Oncorhynchus kisutch

JJ Back and tail fin without black spots but with fine black specklings

M Gill-rakers on first arch 30 to 40..Oncorhynchus nerka

MM Gill-rakers on first arch 20 to 26..Oncorhynchus keta

Salmo salar Linnaeus. Atlantic salmon.
Anadromous in streams of the Maritime Provinces and northward to Ungava Bay; also in the St. Lawrence to the Saguenay. Permanently resident in Grand Lake, N.S., Chamcook Lake, N.B., Lake St. John and originally in Lake Ontario where, however, it has been extinct since 1890 or earlier. Permanent freshwater (landlocked) populations in New England and Maritime Provinces have been regarded as subspecies S. s. sebago Girard, while the Lake St. John population is named S. s. ouananiche McCarthy. So far as known no permanent populations of freshwater salmon have been established in any Canadian waters in which they were not native.

Salmo trutta Linnaeus. Brown trout.
Native in Europe, introduced in numerous waters throughout Canada, where, however, it propagates itself in few if any natural waters.
The population native to Loch Leven and other Scottish and north of England lochs has been regarded as subspecies S. t. levensis Walker, the Loch Leven trout. It has been introduced but it is doubtful if the characters which are supposed to distinguish it from typical trutta have persisted.

Salmo gairdnerii Richardson. Rainbow trout; steelhead.
Native to western America, introduced in numerous waters throughout the rest of Canada, in few of which it has survived except as a result of continued plantings. The rainbow has propagated itself principally in streams tributary to lakes Superior, Huron and Simcoe, also known to reproduce in Pine River, a tributary of the Nottawasaga River, Ontario, and Crooked Creek near Moncton, N.B. Various local populations in western America have received subspecific names such as S. g. irideus Gibbons, the name originally given to the rainbows of a coastwise stream in California. Most or all of the rainbows that have persisted in eastern America have been of the large-scaled steelhead type S. g. gairdnerii.

Salmo kamloops Jordan. Kamloops trout.
Native to the large lakes of British Columbia; introduced in a few lakes in Ontario. Sometimes regarded as a subspecies kamloops of Salmo gairdnerii.

Salmo clarkii Richardson. Cut-throat trout.
Native to western America, including east slope of the Rocky Mountains in southern Alberta. Rarely introduced into eastern Canada.

Salvelinus alpinus (Linnaeus). Alpine char; Hearne's salmon.
Anadromous in streams from Gulf of St. Lawrence (rare), coast of Labrador, northern coast of Canada and of islands to the north; also in streams entering Hudson Bay but not James Bay. Many local forms have been recognized by names such as stagnalis, alipes, arcturus and naresi. Some of these may be found to be warranted as subspecific names. The red trout of Quebec, Salvelinus

marstoni (Garman), which has been reported from many lakes in the Province of Quebec, should probably be regarded as a subspecies of alpinus. The Dolly Varden of western America including the east slope of the Rocky Mountains should also be regarded as a subspecies, Salvelinus alpinus malma (Walbaum).

Salvelinus fontinalis (Mitchill). Eastern speckled trout.
From Maritime Provinces, Newfoundland and Labrador west to the Nelson River in Manitoba. It occurs in north and south tributaries of the Nelson as far as Kettle rapids. Said to occur as far north as Nain on the Labrador coast. In streams entering James Bay but rare northward.

The population in White Pine Lake north of Timagami has been described as species timagamiensis Henn and Rinkenbach and popularly known as Aurora trout. It should probably be regarded as a subspecies of Salvelinus fontinalis. It is characterized by almost complete lack of spots. A similar form is said also to occur in neighbouring lakes such as Clearwater Lake.

The speckled trout of Cascapedia River, P.Q., has been described as subspecies S. f. hudsonicus (Suckley).

Cristivomer namaycush (Walbaum). Lake trout.
From Maritime Provinces (introduced in Nova Scotia?) to Alaska, in all lakes of sufficient depth to provide cold water in summer; south in British Columbia at least to Canim Lake at mileage 101 on the Caribou Road.

The lake trout of the deep waters of Lake Superior has been described as subspecies C. n. siscowet (Agassiz).

Oncorhynchus kisutch Walbaum. Coho.
Native to west coast of America. The species was planted in Lake Erie by the Ohio Division of Conservation in 1933 but no permanent population has resulted.

Oncorhynchus tshawytscha Walbaum. Spring, king, tyee or chinook salmon.
Native to west coast of America; introduced on two occasions (1874-1881 and 1919-1925) into Lake Ontario. Although adults were taken as a result of both plantings, the species has not persisted. Similar plantings were made by the Ohio Fish Commission in Lake Erie between 1873 and 1878 but without any permanent population resulting.

Oncorhynchus gorbuscha Walbaum. Humpback or pink salmon.
Native to west coast of America; occasionally taken in the Mackenzie River.

Oncorhynchus keta Walbaum. Dog or chum salmon.
Native to west coast of America; occasionally taken in the Mackenzie River.

CATOSTOMIDAE

A Dorsal fin with 25 to 40 rays
B Anterior rays of dorsal fin much longer than the rest, forming a sharp point, their length sometimes equalling length of base of fin ..... *Carpiodes cyprinus*
BB Anterior rays of dorsal fin not nearly equalling length of base of fin
C Mouth large and oblique with thin lips, only faintly striate; upper jaw about as long as snout ..... *Megastomatobus cyprinella*
CC Mouth small, lower and less oblique; lips fuller and more or less coarsely striate ..... *Ictiobus bubalus*
AA Dorsal fin with 10 to 18 rays
D Air-bladder of two chambers
E Lateral line well developed in adult; greatest depth less than one-fifth standard length
F Posterior division of air-bladder broad
G Head convex above; scales in more than 50 rows
H Scales fewer than 80 in lateral line ..... *Catostomus commersonii*
HH Scales more than 85 in lateral line ..... *Catostomus catostomus*
GG Head concave above; scales in fewer than 50 rows ..... *Hypentelium nigricans*
FF Posterior division of air-bladder slender ..... *Pantosteus jordani*
EE Lateral line more or less obsolescent in adult; greatest depth more than one-fifth standard length
I Lateral line somewhat developed in adult; rows of black spots, one on each scale, along sides ..... *Minytrema melanops*
II Lateral line completely absent; sides in adult marked by narrow vertical bars. *Erimyzon oblongus*
DD Air-bladder of three chambers
J Lower pharyngeal arch and teeth less heavy
K Lips large and thick; lower pharyngeal arch heavy; subtriangular in cross-section, with teeth which become enlarged downward, subcylindrical and reduced in number. *Placopharynx carinatus*
KK Lips smaller and thinner; lower pharyngeal arch less heavy, distinctly narrower than high in cross-section, with teeth all markedly compressed and numerous, forming a comb-like series
L Caudal peduncle depth less than two-thirds its length ..... *Moxostoma duquesnii*
LL Caudal peduncle depth more than two-thirds its length
M Posterior margin of lip a straight line; head short, in adult 4.3 to 5.4 times

in standard length ..... Moxostoma aureolum

MM Posterior margin of lower lip an angle; head longer, in adult 3.7 to 4.4 times in standard length

N Plicae of lips more or less broken up by transverse creases ..... Moxostoma anisurum

NN Plicae of lips not broken up by transverse creases

O Body scales with dark spots or crescents on scale bases; caudal fin bright red in life. Moxostoma rubrecques

OO Body scales without dark spots or crescents; caudal fin olive in life ..... Moxostoma erythrurum

JJ Lower pharyngeal arch and teeth very heavy, some of the larger teeth of a greater diameter than the pupil ..... Megapharynx valenciennesi

Catostomus commersonnii (Lacépède). Common white sucker.
Generally distributed from Nova Scotia northwestward to the Northwest Territories. A dwarf form, found in the Adirondack Mountains of New York in upland streams and lakes tributary to Lake Ontario and to the St. Lawrence and Hudson rivers, has been described as subspecies C. c. utawana Mather.

Catostomus catostomus (Forster). Northern or sturgeon-nosed sucker.
From Labrador and New Brunswick northwestward to the Yukon, including all of British Columbia. Extends into northern Asia as far as the Yana River. A dwarf form, found in lakes and streams of the Adirondack and Catskill mountains of New York and in the Connecticut River system of New England, has been described as subspecies C.c.nannomyzon Mather.

Hypentelium nigricans (LeSueur). Hogsucker.
In Ontario recorded only from streams tributary to the eastern end of Lake Ontario, Lake Erie, Lake St. Clair and southern Lake Huron; reports of this species from Lake of the Woods have been shown to be in error.

Pantosteus jordani Evermann. Mountain sucker.
Specimens in Royal Ontario Museum of Zoology from Battle and Belanger creeks in southern Saskatchewan.

Minytrema melanops (Rafinesque). Spotted sucker.
Recorded from lakes Erie and St. Clair but not from Canadian waters.

Erimyzon oblongus (Mitchill). Creek chubsucker.
The eastern subspecies (E.o.oblongus) found in the Atlantic coast drainage is said to occur in Nova Scotia and New Brunswick.

Placopharynx carinatus Cope. River redhorse.
St. Lawrence River in the vicinity of Montreal; said formerly to have occurred in Detroit River and Lake Erie.

Moxostoma duquesnii (LeSueur). Black redhorse.
In Ontario reported only from Catfish Creek, Elgin County, and North River a tributary of the Grand River in Oxford County as subspecies M. d. duquesnii (Le Sueur).

Moxostoma aureolum (LeSueur). Northern redhorse.
Lake Champlain and upper St. Lawrence through Great Lakes basin northward throughout Ontario to Hudson Bay and northwestward to the Northwest Territories.

Moxostoma anisurum (Rafinesque). Silver redhorse.
Lake Champlain through the Great Lakes basin, including the Ottawa and upper St. Lawrence rivers; lakes Nipissing and Nipigon; reported from Hudson Bay drainage of Manitoba.

Moxostoma rubresques Hubbs. Greater redhorse.
Lake Champlain and St. Lawrence, Great Lakes basin; in Ontario at least to Lake Huron.

Moxostoma erythrurum (Rafinesque). Golden redhorse.
In Ontario recorded from Lake St. Clair and tributary streams and Catfish Creek, Elgin County.

Megapharynx valenciennesi (Jordan).
Recently rediscovered near the junction of the Ottawa and St. Lawrence rivers; originally described (1844) from Lake Ontario.

Carpiodes cyprinus (LeSueur). Quillback.
Lake Champlain, St. Lawrence and Ottawa rivers, Lake Erie, Lake of the Woods, Red and Assiniboine rivers and Lake Winnipeg.

Megastomatobus cyprinella (Valenciennes). Bigmouth buffalofish.
Southern Manitoba; said to occur in western Lake Erie but not reported from Canadian waters.

Ictiobus bubalus (Rafinesque). Smallmouth buffalofish.
Reported from the Great Plains portion of the Hudson Bay drainage of Canada by Hubbs and Lagler.

CYPRINIDAE

A Dorsal fin long, with more than 11 soft rays; dorsal and anal each with a strong, serrated spine
  B Upper jaw with two barbels on each side..Cyprinus carpio
  BB Upper jaw without barbels .....Carassius auratus
AA Dorsal fin with fewer than 11 rays; no spines in fins
  C Premaxillaries not protractile
    D Scales in lateral line fewer than 55..Exoglossum maxillingua
    DD Scales in lateral line more than 55
      E Snout long, projecting far beyond mouth .....Rhinichthys cataractae
      EE Snout scarcely projecting beyond mouth .....Rhinichthys atratulus

CC Premaxillaries protractile
F Maxillary with a barbel
G Barbel at or near end of maxillary
H Head flat above ..... Platygobio gracilis
HH Head convex above
I Scales more than 55 in lateral line ..... Couesius plumbeus
II Scales fewer than 55 in lateral line
J Snout projecting little beyond mouth
K Angle enclosed by scale radii, about 75° ..... Nocomis biguttatus
KK Angle enclosed by scale radii 95°-105° ..... Nocomis micropogon
JJ Snout projecting considerably beyond mouth
L Body with X-shaped dark spots Erimystax dissimilis
LL Body without definite spots ..Hybopsis storerianus
GG Barbel in advance of lower end of upper jaw, often hidden in groove between upper jaw and side of head
M Scales fewer than 50 in lateral line .....Leucosomus corporalis
MM Scales more than 50 in lateral line
N A black spot near front of base of dorsal fin (indistinct in young); upper jaw extending to vertical through front of eye; scales 52 to 62.....Semotilus atromaculatus
NN No black spot on dorsal fin; upper jaw not reaching a vertical through front of eye; scales 67-72 (sometimes lacks barbel, see below).....Margariscus margarita
FF Maxillary without a barbel
O Scales more than 60
P Intestine with a single main loop; a single dark band along side
Q Peritoneum black; lateral line incomplete; scales more than 80, each with radii on all fields ..... Pfrille neogaea
QQ Peritoneum pale, lateral line complete, scales fewer than 80 with radii only on exposed field
R Upper jaw extending to vertical through front of eye ..... Clinostomus elongatus
RR Upper jaw not reaching a vertical through front of eye ..... Margariscus margarita
PP Intestine with two crosswise coils in addition to primary loop; a dark band between lateral band and back .... Chrosomus eos
OO Scales fewer than 55
S Abdomen behind pelvic fins with a fleshy keel lacking scales; lateral line strongly bowed downward ..... Notemigonus crysoleucas
SS Abdomen behind pelvic fins rounded over and scaled; lateral line not strongly bowed downward

T A dark spot (sometimes faint) at front of dorsal, slightly above base; back flattish; first dorsal ray separated by membrane from first well-developed ray

U Lateral line incomplete; caudal spot faint ..... Pimephales promelas

UU Lateral line complete; a distinct caudal spot .....Hyborhynchus notatus

TT No dark spot at front of dorsal above base (a dark spot at base in Notropis umbratilis); back scarcely flattened; first dorsal ray closely attached to first well-developed ray

V Mouth very small and nearly vertical; dorsal rays typically 9 ..... Opsopoeodus emiliae

VV Mouth larger; dorsal rays typically 8

W Anal rays 9 to 12 (rarely 8)

X Origin of dorsal over or in front of vertical through insertion of ventral fins Notropis cornutus

XX Origin of dorsal behind vertical through insertion of ventral fins

Y Body deep, depth equal to or more than length of head; dorsal with black spot at base, in front ..... Notropis umbratilis

YY Body slender, depth much less than length of head; no black spot on base of dorsal

Z Snout sharp, its length more than two-thirds distance from posterior margin of eye to posterior margin of gill-cover ..... Notropis rubellus

ZZ Snout blunt, its length less than two-thirds distance from posterior margin of eye to posterior margin of gill-cover ..... Notropis atherinoides

WW Anal rays 7 or 8 rarely 9

a Intestine short, with a single main loop

b Dorsal with black blotch on membranes between posterior rays (except in young); eye less than one-quarter length of head in adults.Notropis spilopterus

bb Dorsal without black blotch on membranes between posterior rays; eye more than one-quarter length of head in adults

c A conspicuous black spot on base of caudal fin ... Notropis hudsonius

cc. No conspicuous black spot on base of caudal fin

d Lateral band usually obvious, continued forward through eye and onto muzzle; lateral line incomplete

e Mouth very small, almost vertical, upper jaw extending only to vertical through nostril; lateral line nearly or quite complete; peritoneum blackish ....Notropis anogenus

ee Mouth larger, upper jaw reaching beyond a vertical through nostril almost to below eye; lateral line incomplete; peritoneum silvery

f Lateral band on snout but not on chin (chin not black)

g Anal rays typically 8; dorsal inserted behind vertical through ventral insertion ..... Notropis heterolepis

gg Anal rays typically 7; dorsal inserted over or before a vertical through ventral insertion ..... Notropis bifrenatus

ff Lateral band on chin (chin black) and on premaxillaries..... Notropis heterodon

dd Lateral band merely dusky or absent, not continued forward through eye; lateral line complete

h Anal rays usually 7

i Teeth usually 1 or 2, 4-4, 1 or 2; middorsal stripe not expanded at front of dorsal, but surrounding base of dorsal... Notropis blennius

ii Teeth usually 4-4; middorsal stripe expanded in front of dorsal and interrupted at front of dorsal base....Notropis deliciosus

hh Anal rays usually 8.Notropis volucellus

aa Intestine elongate, coiled on right side

j Dorsal fin rounded; colour brassy; scales with about 20 radii in adult..... Hybognathus hankinsoni

jj Dorsal fin somewhat falcate; colour silvery; scales with about 10 radii in adult.Hybognathus nuchalis

Cyprinus carpio Linnaeus. Carp.
Upper St. Lawrence; Canadian waters of the Great Lakes except Lake Superior; Lake Simcoe and Kawartha lakes; Lake Scugog. In Manitoba the carp is found in Lake Winnipeg and the Red and Winnipeg rivers.

Carassius auratus (Linnaeus). Goldfish.
Has been reported in Detroit River and in protected waters of Lake Erie at Point Pelee and Long Point.

Leucosomus corporalis (Mitchill). Fallfish.
From New Brunswick westward to Algonquin Park and Trent River, Ontario, northward at least to the tributaries of Lake St. John in Quebec, across the divide into the James Bay watershed. A specimen in Royal Ontario Museum of Zoology from Fire River, two miles above Missinabi. In rock pools of swift streams and in clear lakes.

Semotilus atromaculatus (Mitchill). Creek chub; horned dace.
From Nova Scotia and New Brunswick westward through the St. Lawrence and Great Lakes basins to the Lake of the Woods; north in Ontario to the north shore of Lake Huron. Chiefly in streams.
Our form is the typical subspecies.

Margariscus margarita (Cope). Pearl dace.
From Nova Scotia and New Brunswick nearly to the Rocky Mountains. In Ontario north to Lake Nipigon. In cool lakes and creeks, particularly in boggy areas. The subspecies found in Canada is M. m. nachtriebi (Cox).

Couesius plumbeus (Agassiz). Northern chub.
Throughout Canada from Nova Scotia and New Brunswick westward including southern British Columbia; northward to Hudson Bay and Northwest Territories. Chiefly in lakes except at spawning time. Three subspecies have been described; C. p. plumbeus from the Mackenzie River region to the Great Lakes; C. p. dissimilis (Girard) more southern, on the eastern slope of the Rocky Mountains to across the northern part of the Great Plains; C. p. greeni Jordan in northern British Columbia.

Platygobio gracilis (Richardson). Flathead chub.
Manitoba to Northwest Territories.

Nocomis biguttatus (Kirtland). Hornyhead chub.
Southwestern Ontario north to Huron County, apparently not in the Lake Ontario basin. In clear streams with gravel riffles.

Nocomis micropogon (Cope). River chub.
Southwestern Ontario extending further north and east than preceding species to Bruce County and Lake Ontario basin. In clear streams.

Hybopsis storerianus (Kirtland). Silver chub.
In Ontario appears to be confined to Lake Erie.

Erimystax dissimilis (Kirtland). Spotted chub.
In Ontario reported only from Thames River.

Rhinichthys atratulus (Hermann). Blacknose dace.
From New Brunswick through the St. Lawrence and lower Great Lakes region north to Lake Simcoe and Grey County. Reported from the Lake of the Woods region but may not extend into Ontario waters there. In cool streams.
The eastern subspecies R. a. atratulus is the form in the eastern end of Lake Ontario and eastward. In the rest of the Great Lakes region the form is R. a. meleagris Agassiz.

Rhinichthys cataractae (Valenciennes). Longnose dace.
From St. Lawrence drainage in the vicinity of Montreal throughout the Great Lakes region west to southern British Columbia and north to Hudson Bay and Northwest Territories; in swift streams and sometimes along lake shores.
The form in the Great Lakes area is the typical subspecies.

Exoglossum maxillingua (LeSueur). Cutlips.
In Ontario recorded only from the St. Lawrence River at Ivy Lea below Gananoque. Reported from several localities in the Upper St. Lawrence in the vicinity of Montreal.

Pfrille neogaea (Cope). Finescale dace.
Recorded from New Brunswick to Northwest Territories; throughout Ontario except southwest of Lake Simcoe. Characteristic of boggy waters.

Chrosomus eos Cope. Redbelly dace.
From Nova Scotia and New Brunswick to northern British Columbia; throughout Ontario north to 52°; in bog ponds and creeks.

Clinostomus elongatus (Kirtland). Redside dace.
In Ontario found only in streams draining into the northwestern part of Lake Ontario; appears to be confined to clear streams.

Opsopoeodus emiliae Hay. Pugnose minnow.
Taken only twice in Ontario, in a small artificial drainage opening into Mitchell's Bay, Lake St. Clair, and off Fighting Island, Detroit River.

Notemigonus crysoleucas (Mitchill). Golden shiner.
Nova Scotia and New Brunswick to Manitoba; in Ontario north to Lake Abitibi but not reported from Lake Nipigon; in weedy lakes and quiet streams.
The typical subspecies N. c. crysoleucas occurs from the eastern end of Lake Ontario eastward; N. c. auratus (Rafinesque) is the western form.

Notropis atherinoides Rafinesque. Emerald shiner.
From the Upper St. Lawrence River in the vicinity of Montreal and Lake Champlain westward through the Great Lakes to the Red and Saskatchewan rivers, northward to Lake Athabaska; in lakes and larger rivers. Our form is the typical subspecies N. a. atherinoides.

Notropis rubellus (Agassiz). Rosyface shiner.
From the Upper St. Lawrence River in the vicinity of Montreal and Lake Champlain westward through the Great Lakes region north to Lake Nipissing area and Sault Ste. Marie. Erroneously reported from the Lake of the Woods. In rapid waters of clear streams.

Notropis umbratilis (Girard). Redfin shiner.
In Ontario recorded only from tributaries of Lake St. Clair; in lowland streams.
Our form is N. u. cyanocephalus (Copeland).

Notropis cornutus (Mitchill). Common shiner.
From Nova Scotia and New Brunswick to Saskatchewan. Common in clear streams and lakes in southern Ontario but not found north of 49° N. lat.; in cool clear streams and lakes.
Two subspecies have been described. N. c. frontalis (Agassiz) is the more northern. N. c. chrysocephalus (Rafinesque) is found in Ontario only in the drainages of Lakes St. Clair, Erie and Ontario.

Notropis hudsonius (Clinton). Spottail minnow.
Essentially a northern species ranging from Quebec to Northwest Territories. In Ontario at least as far north as 52° 50' N. lat. Northward chiefly in large lakes and rivers but on the prairies it occurs in small, shallow lakes and in a number in which the salinity ranges from 2500 to 3200 p.p.m. The typical subspecies N. h. hudsonius occurs in the Great Lakes and their tributaries except Superior, and in some interior lakes; N. h. selene (Jordan) is the form found in Lake Superior and northwestward.

Notropis heterodon (Cope). Blackchin shiner.
Upper St. Lawrence and Ontario north to Sault Ste. Marie; in clear weedy lakes.

Notropis spilopterus (Cope). Spotfin shiner.
From the Upper St. Lawrence in the vicinity of Montreal and Lake Champlain through the Lower Great Lakes drainage in tributaries of Lake St. Clair, Lake Erie, Lake Ontario, St. Lawrence and Ottawa rivers; in lakes and rivers.
Some regard N. whipplii as distinct from N. spilopterus.

Notropis deliciosus (Girard). Sand shiner.
From Lake Champlain and upper St. Lawrence basins through southern Ontario north to Lake Nipissing; in sandy lakes and larger streams.
The Ontario form is N. d. stramineus (Cope), the northern subspecies.

Notropis blennius (Girard). River shiner.
Red and Assiniboine rivers north to Baptizing Creek in Manitoba, Saskatchewan River in Saskatchewan and Alberta.

Notropis volucellus (Cope). Mimic shiner
From Lake Champlain and Upper St. Lawrence to Lake Nipigon and Lake of the Woods, and north to at least 52° N. lat; in creeks, pools and weedy lakes.
The northern subspecies N. v. volucellus is the Ontario form. Populations in the Lake Erie drainage particularly in Talbot Creek, Ontario, possess characters of the Mississippi Valley form N. v. buchanani Meek.

Notropis heterolepis Eigenmann and Eigenmann. Blacknose shiner.
From Nova Scotia and New Brunswick, Lake Champlain and Upper St. Lawrence River to the Assiniboine River, northward to 52° N.; in quiet waters of streams and in protected bays of lakes.

Notropis bifrenatus (Cope). Bridled shiner.
St. Lawrence in vicinity of Montreal and in eastern Ontario including tributaries; Prinyer's Cove, Bay of Quinte; chiefly in ponds and near marshes in lakes.

Notropis anogenus Forbes. Pugnose shiner.
In Ontario recorded only from Lake Erie and St. Lawrence region; in clear, weedy lakes.

Hybognathus hankinsoni Hubbs. Brassy minnow.
From Lake Champlain and Upper St. Lawrence Valley through Ontario north to Algonquin Park; in sluggish streams and bog waters.

Hybognathus nuchalis Agassiz. Silvery minnow.
The eastern subspecies H. n. regius Girard occurs in the St. Lawrence and Ottawa drainages of Ontario and in the vicinity of Montreal, also in Lake Champlain; in pools and backwater.

Pimephales promelas Rafinesque. Fathead minnow.
From Lake Champlain and Upper St. Lawrence, through the Great Lakes and Prairie Provinces, northward in Ontario to Hudson Bay and in Saskatchewan to 55° N.; in a wide variety of muddy-bottomed streams, ponds and lakes.
Our form is the typical subspecies.

Hyborhynchus notatus (Rafinesque). Bluntnose minnow.
From southern Quebec through the Great Lakes to southern Manitoba. In Ontario north to Timagami and Rainy River region; in streams, ponds and lakes.

AMEIURIDAE

A Adipose fin with posterior margin free
  B Caudal fin forked ..... Ictalurus lacustris
  BB Caudal fin rounded or emarginate
    C Anal rays 24 to 27; chin barbels whitish ..... Ameiurus natalis
    CC Anal rays 17 to 24; chin barbels gray to black
      D Pectoral spine with strong barbs on posterior edge..... Ameiurus nebulosus
      DD Pectoral spine without strong barbs.. Ameiurus melas
AA Adipose fin with posterior margin attached to back and almost continuous with caudal
  E Premaxillary band of teeth with backward lateral extension ..... Noturus flavus
  EE Premaxillary band of teeth without backward lateral extensions

F Body nearly uniform in colour; no strong barbs on posterior edge of pectoral fin ..... Schilbeodes mollis
FF Body mottled; pectoral spine strongly barbed on posterior edge ..... Schilbeodes miurus

Ictalurus lacustris (Walbaum). Channel catfish
Ottawa and St. Lawrence basins, from the vicinity of Montreal, through the Great Lakes to Prairie Provinces. In lakes and large rivers; more characteristic of cool, clear waters than other members of the family.
Our form is the typical subspecies.

Ameiurus natalis (LeSueur). Yellow bullhead.
Southern Ontario from southern Lake Huron through Great Lakes to upper St. Lawrence. In sluggish to fairly rapid waters.
Our form is the typical subspecies.

Ameiurus nebulosus (LeSueur). Brown bullhead.
Generally distributed from New Brunswick to Manitoba, north in Ontario to about 47°N. Lakes and sluggish streams.
Our form is the typical subspecies.

Ameiurus melas (Rafinesque). Black bullhead.
Detroit River and Lake Erie drainage of Ontario. In ponds and sluggish creeks. Our form is the typical subspecies.

Noturus flavus Rafinesque. Stonecat.
From Lake Champlain and upper St. Lawrence near Montreal, through southern Great Lakes region north to Bruce Peninsula. Its occurrence in Manitoba needs confirmation. Chiefly in riffles of streams.

Schilbeodes mollis (Hermann). Tadpole madtom.
In the upper St. Lawrence near Montreal, in its tributaries in Ontario, and lakes Ontario and Erie. In weedy habitats. Formerly known as S. gyrinus. See Occ.Pap.Mus.Zool., Univ.Mich.487.1944.

Schilbeodes miurus (Jordan). Brindled madtom.
In Ontario reported only from Lake St. Clair and Lake Erie drainages. Usually in faster waters.

UMBRIDAE

Umbra limi (Kirtland). Mud minnow.
From Lake Champlain and upper St. Lawrence near Montreal, through southern Ontario to Manitoba. In Ontario north to Lake Nipissing and St. Mary's River. In pools and small streams.

ESOCIDAE

A Gill-covers completely scaled
B Adult with dark vertical bands; lateral line scales about 105 ..... Esox vermiculatus
BB Adult with chain-like reticulations; lateral line scales about 125 ..... Esox niger
AA Gill-covers without scales on lower half
C Marked except in young with light spots

on a darker background ..... Esox lucius
CC Marked with dark spots or bars on a lighter background ..... Esox masquinongy

Esox vermiculatus LeSueur. Mud pickerel.
Lakes St. Clair, Erie and Ontario, St. Lawrence River and Lake Champlain. In quiet, weedy waters.
The relationship of E. americanus Gmelin to vermiculatus is not clear. It may represent an eastern subspecies or separate species.

Esox niger LeSueur. Chain pickerel.
Eastern Ontario, southern Quebec and New Brunswick. In quiet, weedy waters.

Esox lucius Linnaeus. Pike.
Labrador to the Yukon south to northern British Columbia and the Great Lakes. Also in northern Asia and Europe. In lakes as well as in quiet, weedy ponds and streams.

Esox masquinongy Mitchill. Maskinonge.
From the St. Lawrence River to the upper reaches of the Winnipeg River including Ottawa and Rideau rivers, lakes Ontario, Erie, St. Clair and Huron, Georgian Bay and extreme southeast portion of north shore of Lake Superior, Trent River watershed, Lake Simcoe, Lake Nipissing and French River, Lake Timagami, in the Sudbury district north of Chapleau to Bolkow; in the Thunder Bay district from Schreiber to White River and north to the Canadian National Railways and in the Lake of the Woods area. In bays of the Great Lakes, medium sized lakes and larger rivers.
Three subspecies have been recognized.
E. m. immaculatus Garrard. Northern maskinonge. In Wisconsin and Minnesota.
E. m. ohiensis Kirtland. Ohio maskinonge. In Ohio River and Lake Chautauqua, N.Y.
E. m. masquinongy Mitchill. Great Lakes maskinonge. In Great Lakes region.

ANGUILLIDAE

Anguilla bostoniensis (LeSueur). American eel.
Maritime Provinces, St. Lawrence, Lake Ontario and Ottawa basins; originally unknown above Niagara Falls but now occasionally found in lakes Erie and Huron.

CYPRINIDONTIDAE

Fundulus diaphanus (LeSueur). Killifish.
From the Maritime Provinces through the St. Lawrence to Lake Ontario, Lake Erie and southern Lake Huron; also Ottawa River and some interior lakes in eastern Ontario and north of Toronto. In lakes and quiet rivers.
The form in the western part of the Lake Ontario basin and westward is subspecies menona Jordan and Copeland; eastward the typical form is found.

PERCOPSIDAE

Percopsis omiscomaycus (Walbaum). Trout-perch.
Lake Champlain and St. Lawrence, throughout Ontario north to Hudson Bay and northwestward to the Yukon. In lakes ascending streams to spawn.

SERRANIDAE

A Dorsal fins separate; anal rays III, 12; lower jaw projecting
  B Base of tongue with two patches of teeth; body depth about 3.5 in standard length..... *Roccus saxitilis*
  BB Base of tongue with one patch of teeth; body depth about 2.5 in standard length ..... *Lepibema chrysops*
AA Dorsal fins joined; anal rays III, 9; jaws subequal ..... *Morone americana*

Roccus saxitilis (Walbaum). Striped bass.
Anadromous in Gulf of St. Lawrence and Maritime Provinces; not uncommon in Shubenacadie River and Grand Lake, N.S.; occurs also in the St. Lawrence at least from Quebec City to the vicinity of Montreal.

Lepibema chrysops (Rafinesque). White bass.
St. Lawrence River, Lake Ontario, Lake Erie and Detroit River; also Lake Nipissing.

Morone americana (Gmelin). White perch.
Ascends streams of Maritime Provinces and resident in some lakes in the same area and reputedly in some Quebec lakes.

PERCIDAE

A Bones of head serrate; mouth large, upper jaw extending to middle of eye or beyond; branchiostegals 7; usually reaching a large size
  B Marked with dark vertical bars; no canine teeth ..... *Perca flavescens*
  BB Body mottled; canine teeth strong
    C Dorsal fin with round, black spots; membrane between last 2 or 3 spines of dorsal not uniformly black; pyloric caeca 4 to 7 ..... *Stizostedion canadense*
    CC Dorsal fin with dusky mottlings; membrane between last 2 or 3 spines of dorsal almost uniformly black; pyloric caeca 3 .....*Stizostedion vitreum*
AA Bones of head smooth; mouth small, upper jaw usually not reaching middle of eye; branchiostegals 6; mostly small fishes
  D Body very slender and elongated; flesh pellucid; scales of trunk confined to median sides..*Ammocrypta pellucida*

DD Body less elongated; flesh opaque; sides of body almost completely scaled.

E Pelvic fins separated by a space at least three-fourths as wide as base of either fin; anal fin usually almost as large as second dorsal, sometimes larger

F Premaxillaries protractile ..... Cottogaster copelandi

FF Premaxillaries scarcely protractile, bound to snout by a fleshy frenum (Sometimes crossed by a shallow groove in Imostoma)

G Snout projecting beyond upper lip; cross-bars numerous and narrow.... Percina caprodes

GG Snout not projecting beyond upper lip; cross-bars broad or none

H Premaxillary frenum usually hidden by a furrow behind upper lip; lateral blotches usually 8 to 15; scales 50-56 .....Imostoma shumardi

HH Premaxillary frenum usually not hidden by a cross-furrow; lateral blotches larger, usually 7 or 8; scales 64-70 .....Hadropterus maculatus

EE Pelvic fins separated by a space less than three-fourths as wide as base of either fin (Except in Boleosoma); anal fin smaller in area than second dorsal fin

I Premaxillaries fused to preorbital at sides and overhung slightly by snout.Etheostoma blennioides

II Premaxillaries free from preorbital at sides and projecting forward as far as or farther than snout

J Premaxillaries protractile; pelvic fins separated by a space about as wide as base of either fin ..... Boleosoma nigrum

JJ Premaxillaries nonprotractile; pelvic fins inserted very close together

K Lateral line obsolete; dorsal spines usually 6 ..... Microperca microperca

KK Lateral line partially developed

L Dorsal spines ending in fleshy knobs (conspicuous only in breeding males) lower jaw projecting or jaws about equal; head completely scaleless and males without bright colours ..... Catonotus flabellaris

LL Dorsal spines not ending in fleshy knobs; lower jaw scarcely or not at all projecting; head partially scaled and males brilliantly coloured

M Soft dorsal rays 9 to 11; body rather slender; marked with blotches ..... Poecilichthys exilis

MM Soft dorsal rays 12 to 14; body rather deep; marked with vertical

bars nearly complete across
posterior part of body .....Poecilichthys caeruleus

Perca flavescens (Mitchill). Yellow perch.
Nova Scotia and New Brunswick through Great Lakes basin and Ontario north to 52° 50' N. and northwestward to Lesser Slave Lake. In lakes, ponds and quiet streams.

Stizostedion canadense (Smith). Sauger.
New Brunswick, St. Lawrence basin, Lake Champlain, Great Lakes including Lake Nipigon, Lake Winnipeg. Especially common in lakes Erie and Winnipeg. In Ontario north to 52° 50' N. Our form is S. c. canadense.

Stizostedion vitreum (Mitchill). Pike-perch, doré.
St. Lawrence River and Great Lakes basins, north in Ontario to Hudson Bay and northwestward to Great Slave Lake. In lakes and the larger streams.
The blue phase Stizostedion vitreum glaucum Hubbs is common in some waters, notably Lake Erie.

Imostoma shumardi (Girard). River darter.
Reported for Ontario only from Lake Attawapiskat and vicinity of Sioux Lookout and for Manitoba from the Winnipeg River. In medium to large-sized rivers.

Hadropterus maculatus (Girard). Blackside darter.
Drainages of Lake Erie, Lake St. Clair and Lake Huron as far north as Bruce Peninsula; also in Red and Assiniboine rivers, Manitoba. In weak currents of streams.

Percina caprodes (Rafinesque). Log-perch.
From Lake Champlain and upper St. Lawrence River to Delaronde Lake in northern Saskatchewan, north in Ontario to Hudson Bay and in Manitoba to the north of The Pas. Usually over sand, gravel or boulders. Our form is subspecies P. c. semifasciata (DeKay).

Cottogaster copelandi (Jordan). Channel darter.
Reported for Ontario only from Detroit River; upper St. Lawrence near Montreal.

Ammocrypta pellucida (Baird). Sand darter.
In Ontario confined to Lake Erie and Lake St. Clair drainages; upper St. Lawrence near Montreal. Usually over sandy bottoms of lakes and streams.

Boleosoma nigrum (Rafinesque). Johnny darter.
From the Maritime Provinces to Saskatchewan; in Ontario north to Hudson Bay. Over sand or gravel in lakes, also in streams.
Three subspecies occur B. n. nigrum (Rafinesque) from Saskatchewan to western Quebec; B. n. olmstedi (Storer) from the Ottawa River and eastern part of Lake Ontario (at lower elevations than typical nigrum), to Maritime Provinces; B. n. eulepis Hubbs and Greene, in Lake St. Clair, Detroit River and Lake Erie; in weedier situations than those preferred by B. n. nigrum.

Poecilichthys exilis (Girard). Iowa darter.
From the upper St. Lawrence in Quebec to Sylvan Lake, Alberta, north in Ontario to Lake Attawapiskat and in Saskatchewan to Prince Albert National Park. Usually over muddier bottoms than other darters.

Poecilichthys caeruleus (Storer). Rainbow darter.
Upper St. Lawrence near Montreal; drainages of western end of Lake Ontario, Lake Erie, Lake St. Clair, southern Lake Huron including southern Georgian Bay. In riffles of streams.
Our form is the typical subspecies.

Catonotus flabellaris (Rafinesque). Fan-tail darter.
Drainages of upper St. Lawrence in Quebec and of lakes Ontario, Erie and St. Clair in Ontario. Usually in riffles.
Our form is the typical subspecies.

Microperca microperca (Jordan and Gilbert). Least darter.
Drainages of western end of Lake Ontario, Lake Erie and Lake St. Clair. In quiet waters often among vegetation.
Our form is the typical subspecies.

Etheostoma blennioides Rafinesque. Greenside darter.
In Ontario only in Lake St. Clair drainage. Said to prefer riffles where rocks are coated with green algae.
Our form is the typical subspecies.

CENTRARCHIDAE

A Anal spines 3
- B Scales small 58 or more in lateral line; body depth about one-third standard length
  - C Upper jaw when mouth is closed not extending beyond vertical from hind margin of eye; dorsal fins connected; shortest spine more than half as long as longest ..... Micropterus dolomieu
  - CC Upper jaw when mouth is closed extending beyond vertical from hind margin of eye; dorsal fin almost divided into two, shortest spine less than half length of longest..Huro salmoides
- BB Scales large, 53 or fewer in lateral line; body depth usually about one-half standard length
  - D Pectoral fin short and rounded, its length 4 times in standard length
    - E Scales smaller, 44 or more in lateral line; opercle stiff to margin, its membrane wide and light coloured ..... Lepomis cyanellus
    - EE Scales larger, 39 or fewer in lateral line; opercle flexible posteriorly, its membrane with a narrow red margin behind..... Lepomis megalotis
  - DD Pectoral long and pointed, longest ray a little more than 3 times in standard length
    - F A red or orange spot on lower posterior corner of gill-cover (white or cream-coloured in preserved specimens); no black blotch

on dorsal ..... Lepomis gibbosus

FF No red or orange spot on gill-cover; dorsal with a diffuse black blotch at base of last rays ..... Lepomis macrochirus

AA Anal spines 5 or more

G Dorsal spines 11 or 12; base of anal fin about one-half length of dorsal base ....Ambloplites rupestris

GG Dorsal spines 6 to 8; base of anal about equal to length of dorsal base

H Dorsal spines usually 6; length of dorsal fin base much less than distance from origin of dorsal to eye; dark markings tend to form vertical bars .....Pomoxis annularis

HH Dorsal spines usually 7 or 8; length of dorsal fin base about equal to distance from origin of dorsal to eye; dark markings not forming bands ..... Pomoxis nigro-maculatus

Micropterus dolomieu Lacépède. Small-mouth bass.

Original distribution included the watersheds of the St. Lawrence River and Great Lakes. In Ontario the known native occurrences include southern Ontario north to slightly beyond Lake Nipissing, as well as the region south of Lake Nipigon. The range has been considerably extended by introductions in the Lake of the Woods region, Ontario, as well as in Nova Scotia, New Brunswick, Manitoba and Saskatchewan. In cool, clear lakes and larger streams.
Our form is the typical subspecies M. d. dolomieu.

Huro salmoides (Lacépède). Large-mouth bass.

Original distribution in Canada included southwestern Quebec and southern Ontario, the original range being essentially similar to that of the small-mouth species except for differences due to habitat preferences. Introduced in some Manitoba waters. It prefers lakes and slow-moving rivers with an abundance of vegetation.

Lepomis cyanellus Rafinesque. Green sunfish.

Reported from Ontario only from little lakes at the head of Avon River a tributary of the Thames River.

Lepomis gibbosus (Linnaeus). Pumpkinseed.

From Maritime Provinces to Ontario as far north as Timagami and as far west as Sault Ste. Marie. Prefers weedy lakes and ponds.

Lepomis macrochirus Rafinesque. Bluegill.

Lake Champlain, St. Lawrence River and in southern Ontario from drainages of lakes Ontario, Erie and St. Clair, also in some Rideau River waters. In lakes and ponds.
Our form is the typical subspecies L. m. macrochirus.

Lepomis megalotis (Rafinesque). Long-ear sunfish.

In Ontario reported only from drainages of Lake Erie, Lake St. Clair and Georgian Bay. In lakes, ponds and streams.
Our subspecies is L. m. peltastes (Cope).

Ambloplites rupestris (Rafinesque). Rock bass.
From Lake Champlain and upper St. Lawrence in Quebec through the Great Lakes region, to Manitoba, north in Ontario to Lake Abitibi and in Manitoba to the Narrows of Lake Winnipeg. In lakes and rocky streams.
Our form is the typical subspecies A. r. rupestris.

Pomoxis nigro-maculatus (LeSueur). Black crappie.
Upper St. Lawrence, Ottawa River, and lakes Ontario, Erie and St. Clair, and waters immediately tributary; also in southern Manitoba. Weedy lakes, ponds and streams.

Pomoxis annularis Rafinesque. White crappie.
Western end of Lake Ontario, Lake Erie and Lake St. Clair. In turbid streams and lakes.

ATHERINIDAE

Labidesthes sicculus (Cope). Brook silverside.
In drainages of upper St. Lawrence and Ottawa (vicinity of Ottawa City), lakes Ontario, Erie, St. Clair and Georgian Bay. In surface waters of quiet habitats.
Our form is the typical subspecies.

SCIAENIDAE

Aplodinotus grunniens Rafinesque. Freshwater sheepshead.
From Lake Champlain and upper St. Lawrence through Great Lakes (except Superior) to Red and Assiniboine rivers, Lake Winnipeg and Lake Manitoba (rare). In Ontario north to Lake Abitibi.

COTTIDAE

A Gill-membranes free from the isthmus; dorsal fins widely separated ..... Triglopsis thompsonii
AA Gill-membranes attached to isthmus; dorsal fins scarcely separated.
  B Preopercular spine conspicuously curved; head flattened; lateral line complete; body usually prickly ..... Cottus ricei
  BB Preopercular spine short and little curved; head rounded; lateral line usually terminating below second dorsal; body scarcely prickly
    C Pelvic rays typically I, 3; palatine teeth usually not developed ..... Cottus cognatus
    CC Pelvic rays typically I, 4; palatine teeth usually present ..... Cottus bairdii

Triglopsis thompsonii Girard. Deepwater sculpin.
Deepwater of Great Lakes including Lake Nipigon.

Cottus ricei Nelson. Rice's sculpin.
Great Lakes north to Fort Severn on Hudson Bay and westward to

southern Alberta and Northwest Territories. Usually in lakes or large rivers.

Cottus cognatus Richardson. Miller's thumb.
Labrador to Alaska and southward to Great Lakes and beyond. In lakes or cool creeks; often regarded as an index of habitats suitable for speckled trout.

Cottus bairdii Girard. Muddler.
In Ontario recorded from Lake Nipigon and Lake Attawapiskat southeastward; in Quebec from the upper St. Lawrence near Montreal. Often in warmer waters than cognatus.
Two subspecies occur - C. b. bairdii, the northern form, and C. b. kumlieni (Hoy), from the entire margins of lakes Superior, Huron and Ontario, and perhaps the eastern end of Lake Erie; also the St. Lawrence River, scarcely ascending streams.

GASTEROSTEIDAE

A Innominate bones of the pelvis joined forming a median plate on belly, behind ventrals
B Dorsal spines 5 to 11
C Dorsal spines 7 to 11 ..... Pungitius pungitius
CC Dorsal spines usually 5 ..... Eucalia inconstans
BB Dorsal spines 3 ..... Gasterosteus aculeatus
AA Innominate bones not joined, each extending as a strong process under the skin, outside the ventrals, the area between them flat and not bony; dorsal spines 4 ..... Apeltes quadracus

Pungitius pungitius (Linnaeus). Nine-spine stickleback.
Salt and freshwaters of Northern Hemisphere. In southern Canada confined to larger lakes but northwestward in smaller waters.

Eucalia inconstans (Kirtland). Brook stickleback.
Maritime Provinces to northern British Columbia, in Ontario to Hudson Bay. Confined to freshwater, especially in boggy lakes and streams.

Gasterosteus aculeatus Linnaeus. Three-spine stickleback.
Salt and freshwater of Northern Hemisphere. Not as far inland from salt water as Pungitius; Great Lakes not above Niagara Falls; appears to have survived probably as a relic in some small lakes north of the Ottawa.

Apeltes quadracus (Mitchill). Four-spine stickleback.
In a few Maritime Provinces waters including Bideford River, P.E.I., and Grand Lake, N.S.

GADIDAE

Lota lota (Linnaeus). Burbot.

In all the deepwater lakes and larger northern rivers of Canada from New Brunswick to the Yukon. In lakes and large rivers.
The typical form L. l. lota is found in northern Asia and northern Europe. The form found in most of northern North America is L. l. maculosa (LeSueur), which probably intergrades with L. l. leptura in the region of the Yukon River, Alaska and northeastern Siberia.

CHARACTERS AND MEASUREMENTS USED IN DESCRIPTION AND IDENTIFICATION OF FISH.

In the description and identification of fish, certain structures and body proportions are ordinarily used.

All measurements are made as along a straight line, not following the curvature of the body or other part. The length of a fish is measured in two ways:

The standard length is from tip of the snout to the end of the vertebral column and is usually expressed in millimeters. This is the length with which other measurements, e.g. that of the head, etc., are compared.

The total length is from the tip of the snout to the end of the middle rays of the tail or caudal fin. This measurement is usually expressed in inches and is the popular measure of the length of a fish.

The depth is the vertical distance through the body at its deepest part.

The width is the distance through the fish at its widest part.

The caudal peduncle is measured from a vertical through the insertion of the last ray of the anal fin to the end of the vertebral column. Its depth is taken at its slenderest part.

The length of the head ("head") is from the tip of the snout to the most posterior part of the opercular bone, including spines, if any. It does not include the fleshy covering which often projects backward beyond the end of the opercular bone.

The depth of the head ("head depth") is from the occiput to the most ventral point on the suboperculum or interoperculum.

Diameter of eye ("eye") is the diameter of the eyeball.

The snout is measured from the tip of the upper jaw to the anterior margin of the orbit.

The maxillary is measured from the tip of the snout to the posterior end of the upper jaw.

It should be noticed that the upper jaw in bony fishes is made up of a premaxillary and a maxillary. The latter often has one or more small bones or supramaxillaries attached to it as in the trout. In trout and many other soft rayed fishes, the premaxillary is much shorter than the maxillary. In such fish the maxillary usually bears teeth and forms the border of the mouth. In the perch and many other spiny-rayed fish the premaxillary forms the border of the mouth, the toothless maxillary being excluded from the gape.

Fins consist of supporting rods or fin-rays and membrane. Fin rays are either soft or spinous. Soft rays are distinguished from spines by their jointed structure, indicated by "cross-marks" on the rays. Spines are usually though not always sharp pointed. Soft rays are usually split or branchedat their upper ends while spines are not branched. In descriptions the number of soft rays is indicated by Arabic numerals, and the number of spines by Roman numerals. When a fin contains both spines and soft rays, the number is indicated thus, III, 13, a comma being used to separate the numerals indicating the different kinds of rays in the same fin. When a dash is used to separate the numerals, it indicates two separate fins, thus "Dorsal XIII--II, 12, means two dorsal fins, the first of which contains 13 spines and the second two spines, followed by 12 soft rays.

Fins are either paired or median. The latter are dorsal, caudal and anal, and in some fishes the adipose, a fleshy fin which does not contain rays. There are usually two pairs of paired fins, viz., pectoral and pelvic. The pelvics in most spiny-rayed fish, e.g., perch, are placed in a thoracic position although in a more ventral position than the pectorals. In this position they are usually called ventral fins. In most soft-rayed fish the pelvics are placed beneath the abdomen and are described as abdominal in position.

The height of a fin is measured on the longest ray. The length or base along the base from the front of the first ray to the posterior margin of the last.

In counting soft rays, the rudimentary rays are sometimes omitted. Rudimentary rays are the unbranched ones at the beginning of a fin which are closely appressed, without membranes between them and ordinarily not more than half the length of fully developed rays. The last ray of the dorsal and anal fins are often split nearly or quite to their bases but they are counted as single rays even when split to the base.

The scales are useful diagnostic features, such characters as their size and arrangement being commonly used in descriptions of species. The size of the scales are most easily indicated by giving the number of scales in the lateral line or in a horizontal axis along the side if the lateral line is absent. In the case of trout the number of diagonal rows is usually given as this is found to be more satisfactory than the enumeration of the scales in the lateral line. Sometimes the number of scales in oblique series from the midline of the back and of the belly to the lateral line are also given. The formula "scales 7-60-16" indicated 60 scales in the lateral line, 7 in an oblique series above the lateral line and 16 below.

Gill-rakers are bony tooth-like appendages along the inner or anterior margin of gill arches. The number and length of these are of diagnostic value. The counts are made of those on the first gill arch. In removing the arch for the purpose of counting the rakers, care must be taken that the complete arch is removed and no rakers lost at the ends. Usually the number of rakers on the upper and lower arm of the arch are given separately thus "gill-rakers 10 + 18", indicating a total of 28 gill-rakers on the first arch, 10 above the angle and 18 below.

Scales of most common fish (Teleosts) are in the form of thin bony plates which overlap like the shingles of a roof. These scales are of two types, (1) Cycloid scales in which the hinder edge is smooth, and (2) Ctenoid in which the hinder edge is roughened by a series of tooth-like spines. The gar pike, a primitive teleost, is covered by hard, shiny, diamond-shaped plates which do not overlap but articulate with one another by peg-and-socket joints. From the hard, enamel-like material, ganoine, which covers such scales, they are known as ganoid scales.

The characters of the pharyngeal bones are of importance in certain groups, such as Cyprinidae, Catostomidae and Centrarchidae.

The lower pharyngeals lie behind the gill arches at the sides of the opening into the oesophagus. They represent a fifth gill arch and often bear teeth on their inner margins. In the Catostomidae or sucker family these teeth are numerous and in a single row. In the Cyprinidae they are in 1 to 2 rows (3 in the introduced carp) with 4 to 7 teeth in the main row and fewer in the others. In Ontario species the main row usually contains 4 or 5 teeth and the inner row 0, 1 or 2. The formula "teeth 2,4-4,2" means 4 teeth in the main row and 2 on the inner row on each side.

In Centrarchidae the lower pharyngeals bear many conical or paved teeth. These pharyngeal teeth are used to crush or tear the food in the throat. They are of different forms, pointed, hooked or molar-shaped, depending on the nature of the fish's food. The lower pharyngeal bone may be removed for examination by cutting its attachment at the upper and lower ends and then grasping the arch with forceps and pulling it forward.

GLOSSARY

Abdominal - pertaining to the abdomen or belly. Ventral fins are said to be abdominal in position when they are placed at a considerable distance behind the pectorals.

Adipose fin - a fleshy fin-like projection on the backs of such fishes as catfish, whitefish, salmon, trout, etc., situated behind the dorsal fin.

Barbels - fleshy projections, sometimes developed as long "feelers" as in the catfish; sometimes as much shorter structures.

Branchiostegal membrane - see gill membrane.

Branchiostegal rays - the bony rays supporting the branchiostegal membrane.

Canine teeth - large conical teeth in front part of the jaws.

Caudal - pertaining to the tail.

Ctenoid - scales have the hinder edge roughened by the possession of small tooth-like spines, instead of being smooth as in cycloid scales.

Cycloid - scales have the hinder edge smooth, instead of roughened as in ctenoid scales.

Entire - with a smooth outline, not serrate or notched.

Ganoid - the scales or plates of such fish as sturgeon and gar pike, characterized by the possession of a very hard surface made of ganoine, a kind of enamel.

Gill membrane - or branchiostegal membrane; a membrane supported by bony rays, beneath the operculum.

Heterocercal - an unsymmetrical caudal fin possessed by such fish as the sturgeons and most sharks in which the posterior end of the vertebral column bends upwards and continues nearly to the end of the upper lobe of the fin which projects farther backward than the lower lobe.

Homocercal - a caudal fin externally symmetrical, or disposed equally above and below the line of the body axis, but internally unsymmetrical in that the end of the vertebral column is bent slightly upwards as in the heterocercal condition. The upturn of the vertebral column however is not sufficient to affect the external symmetry of the tail fin.

Insertion - the anterior point of attachment of a fin is called its insertion.

Isthmus - the narrow portion of the body projecting forward below the head and between the gill membranes.

Jugular - pertaining to the throat. Ventral fins of fishes are said to be jugular when they are placed in advance of the pectorals.

Lateral line - is a conspicuous line of raised pores along the side of many fishes. The pores, usually one on each scale in one longitudinal row of scales, communicate with an underlying canal containing sensory organs. This canal and the external pores which communicate with it are filled with mucus. The function of the sense organs of the lateral line system are not well understood but they are believed to be sensitive to disturbances or vibrations of various kinds in the water and thus to give the fish information as to the movements of other fish, including enemies and prey and also of their approach to a rock, the shore, etc.

Pectoral - pertaining to the breast.

Pectoral fins - the paired fins of fishes placed just back of the head anterior to and above the ventral or pelvic fins.

Pelvic fins - when the ventral fins are abdominal in position they are referred to as pelvic.

Peritoneum - membrane lining the abdominal cavity.

Protractile - the premaxillary bones of fishes are said to be protractile when they may be drawn forward leaving a groove between them and the bones of the skull.

Serrate - notched like a saw.

Ventral - pertaining to the abdomen.

Ventral fins - the paired fins of fishes usually placed below and behind the pectoral fins.